

JEDEC STANDARD

EXTENSION TO JESD51 THERMAL TEST BOARD STANDARDS TO ACCOMMODATE MULTI-CHIP PACKAGES

JESD51-32

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION



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(From JEDEC Board Ballot JCB-10-63, formulated under the cognizance of the JC-15 Committee on Thermal Characterization.)

1 Scope

This document addresses the need for extending the existing thermal test board standards to accommodate the potential of higher electrical connection needs of multi-chip packages (MCPs) and the associated wire routing to implement these connections. The extensions described below also are applicable to single chip packages needing more than 36 electrical connections for the test.

2 Normative References

The following documents are recommended reading for reference and thermal test board standard description purposes:

- [1] JESD51-3, “Low Effective Thermal Conductivity Test Board for Leaded Surface Mount Packages”
- [2] JESD51-5, “Extension of Thermal Test Board Standards for Packages with Direct Thermal Attachment Mechanisms”
- [3] JESD51-7, “High Effective Thermal Conductivity Test Board for Leaded Surface Mount Packages”
- [4] JESD51-9, “Test Boards for Area Array Surface Mount Package Thermal Measurements”
- [5] JESD51-10, “Test Boards for Through-Hole Perimeter Leaded Package Thermal Measurements”
- [6] JESD51-11, “Test Boards for Through-Hole Area Array Leaded Package Thermal Measurements”

3 Extensions

While the 36 connections of the 18/36 pin edge connector referenced in the JESD51 series of documents [1-6] has proved adequate for the large majority of single chip packages, there is the likelihood that MCPs may require more connections to power up the various heat sources and measure the temperature of those heat sources.

3.1 Interface Connector

The type and size of the interface connector is not critical for thermal measurements provided that the connector does not impinge on the buried planes and trace fan-out area defined by the above standards and does not render the board unusable in any of the thermal test environments described in JESD51. The interface connection should always occur on one board edge as shown in the referenced documents; connectors are not allowed on any of the other three edges.

Wires can be attached to the thermal test board but only in the area reserved for the edge-finger connector. No wires should be attached directly to package leads or contacts.

The method for electrical interconnection to the board should be fully documented and included in the resultant data report generated for the thermal measurements.

3.2 Wire Routing

Thermal test boards are designed to provide a well defined heat flow path from the mounted package into the board. For instance, JESD51-3 [1] requires a minimum of 25mm-long connection trace from the package body out to a plated through hole. The package and the trace areas constitute a “keep out” area – no wiring may be in this area either on the top (package-mounted side) or bottom side of the board.

The wiring implemented outside of the “keep out” area must not interfere with the thermal environment associated with a particular measurement. Some examples are:

- a) Forced Convection (i.e., moving air) measurements - the wiring should not interfere with normal air flow over the board and minimally perturb the air flow under the board.
- b) Junction-to-Board measurements – there is a second “keep out” area that has to be considered, the area where the ring cold plates clamp the board. This should not be a problem because the ring cold plates clamp on the board in the trace area.
- c) Natural Convection (i.e., still air) measurements - the wiring should not interfere with natural air flow over the board top surface. Thus, it is best to implement the wiring on the back side of the board.

3.2 Wire Routing (cont'd)

When adding additional wiring to a thermal test board, it is necessary to use wire of sufficient size (see Table 1 of [3]) to handle the current requirements. As the voltage levels used in thermal measurements are usually relatively low, the wire insulation can be minimal.

The wire routing implementation on the board should be fully documented and included in the resultant data report generated for the thermal measurements. A top and bottom photograph of the board would be most helpful.

3.3 Board Traces and Planes

The JESD51 series of board specifications [1-6] must be followed for the MCP packages for trace thickness, trace density to achieve the same conductivity of the board and connection to the package. Deviations from the standard design that are required to supply the needed connections must always be designed to replicate the board conductivity of the original specification. The changes from the original specifications must be documented.



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☐ Requirement, clause number _____

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